A Sustainable Water Supply for our Future

The Cheapest Water You Will Ever Have Is The Water You Already Have!

Cost

$1.00 - $6.00

Depending on inclusion of wastewater.

Treatment Cost

20 to 60 cents per 1000 gallon

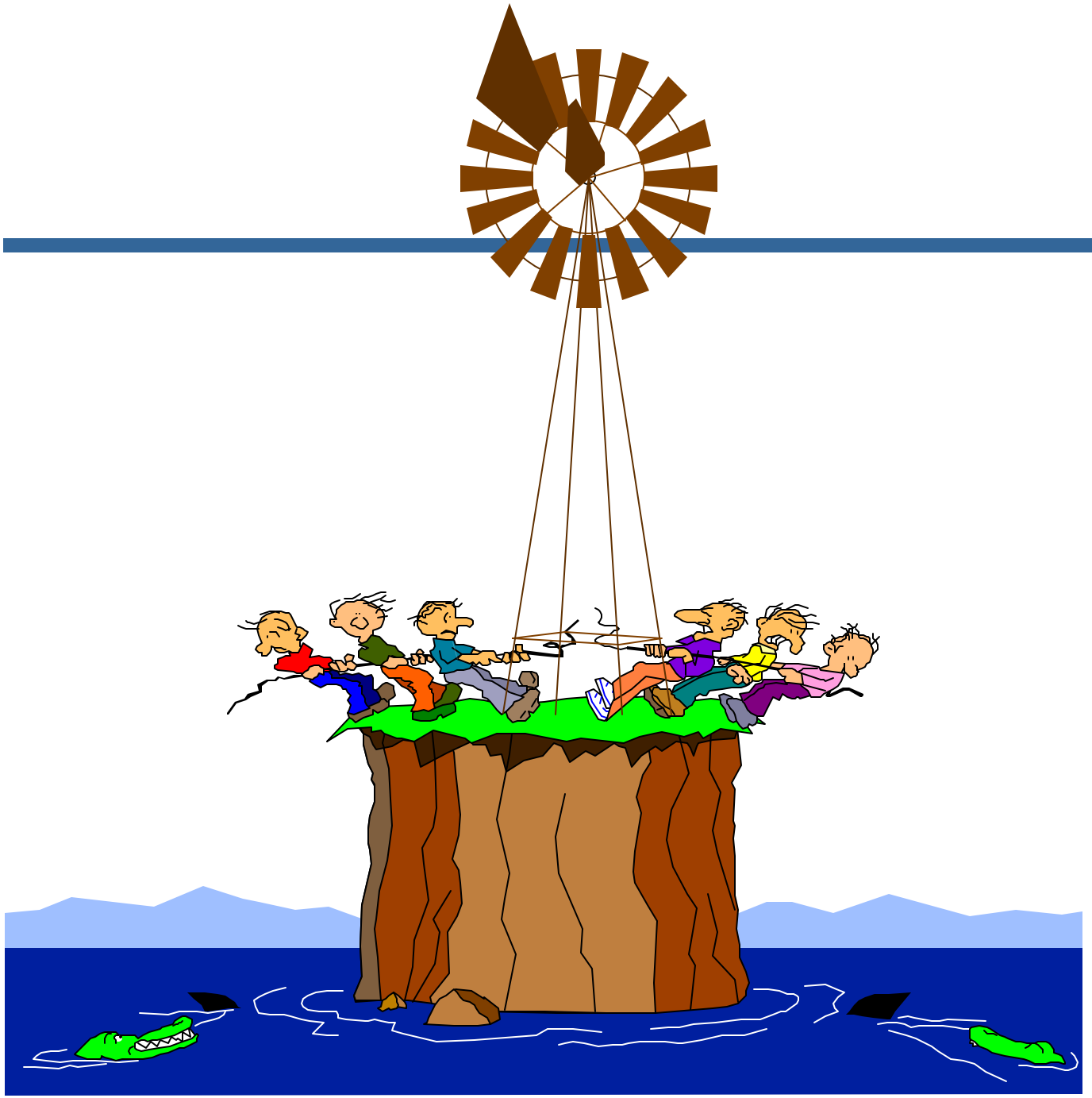
Depending on inclusion of wastewater.

Other Reasons

- Environmental costs and limitations
- Availability of new conventional sources limited
- Political implications

The Nature of Freshwater Resources

Water is an infinitely replenishable resource, but at a **finite** and **variable** rate.



You can only get as much as mother nature allows you to. Any more & ????

There are only three things in life that are certain

Death, *Taxes*, **&**

Energy/Water

- Hot water use
- Cooling Towers
- Evaporation Credit Program

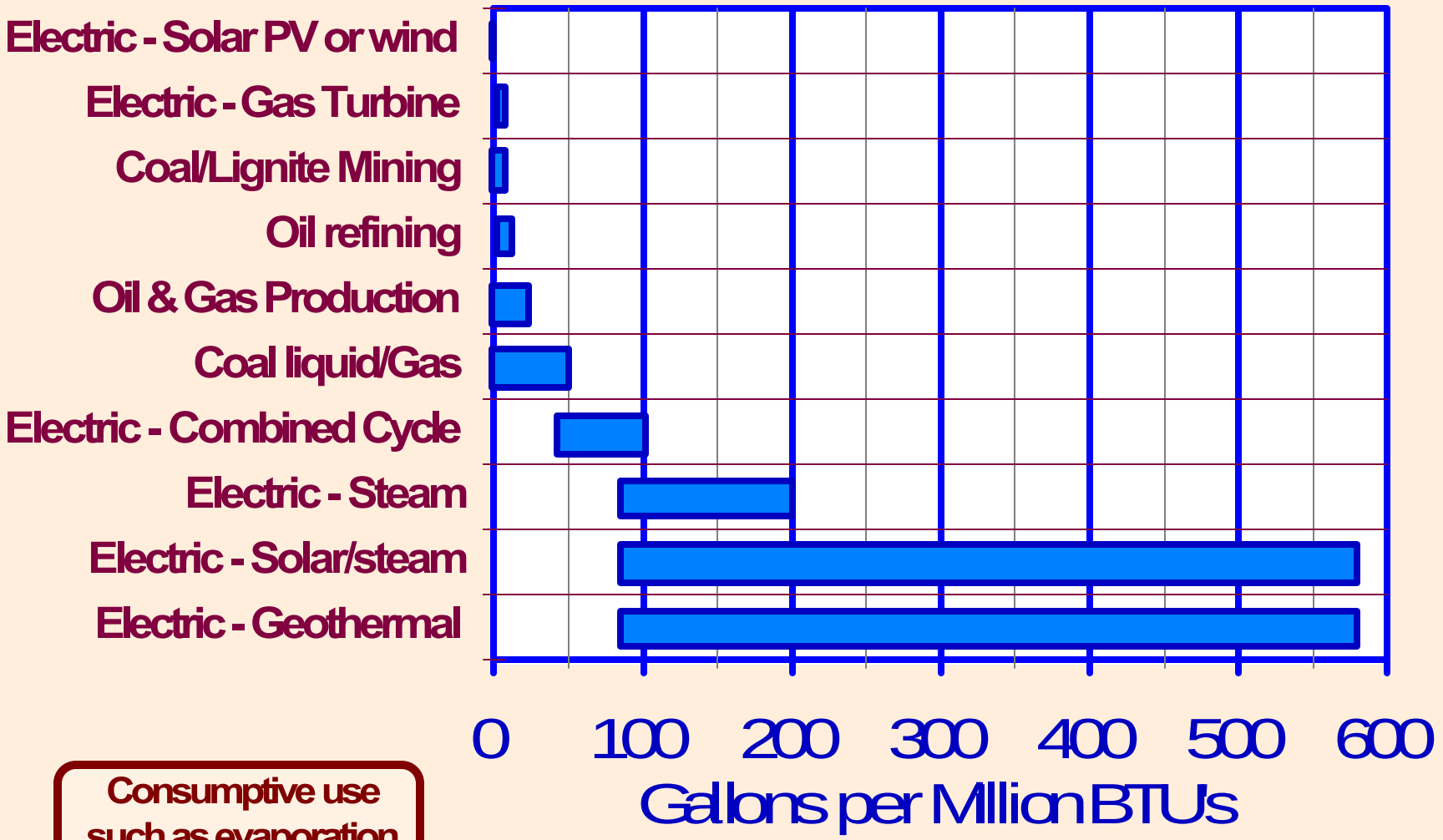
Energy for Water Production

- **4% to 5% of all electricity sold in the US is for water and wastewater operations**

- **In Austin, we use 3.9 kWh per 1000 gallons including sewer.**

Water for Energy Production

Gallons per Million BTUs



Consumptive use such as evaporation

What does this mean to you in dollars & cents?

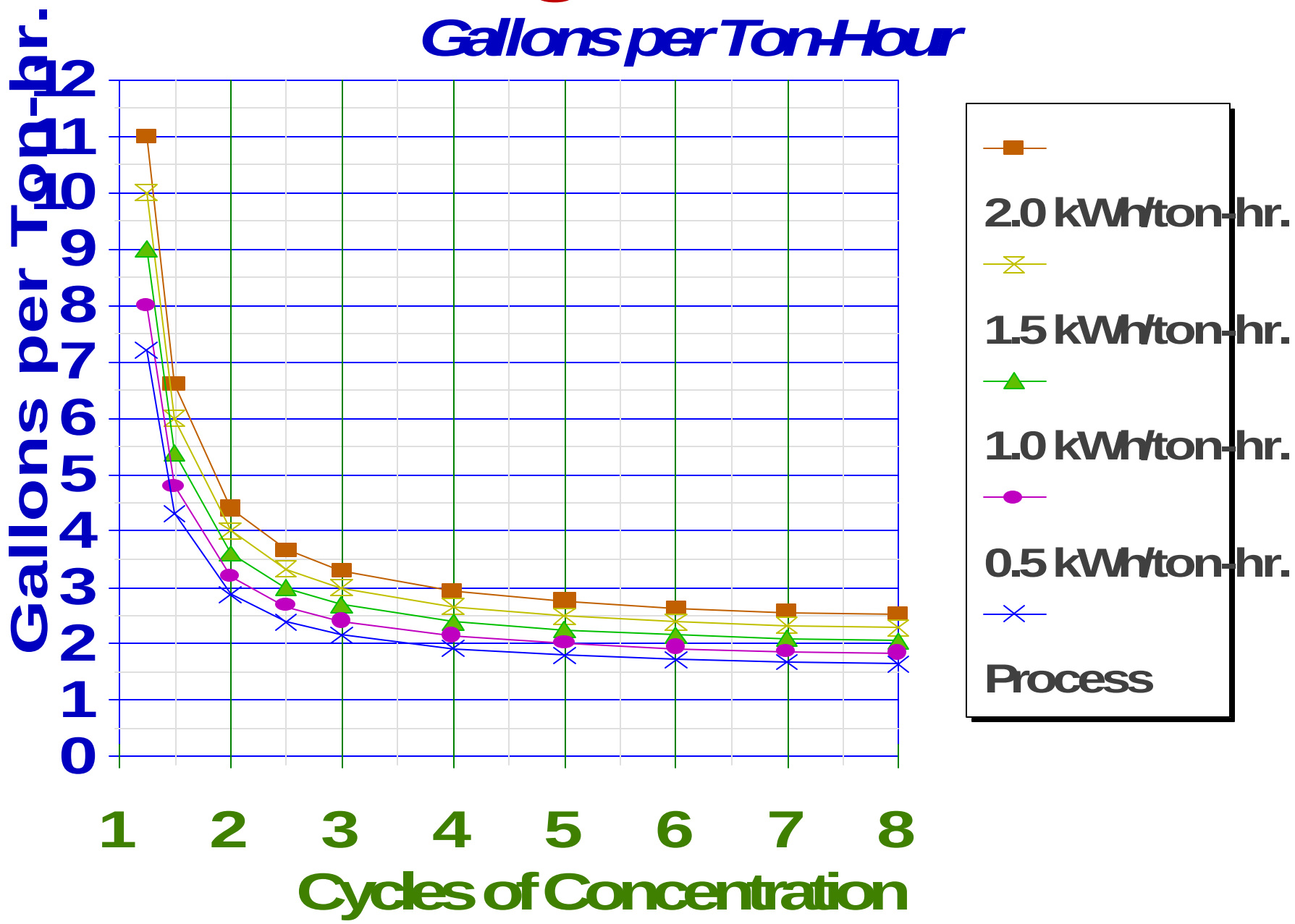
Water & Wastewater Alone - $850 per year

Hot Water (Gas) - $1,380 per year

Hot Water (Electric) - $2,000 per year

Cooling Tower Water Use

Gallons per Ton-Hour

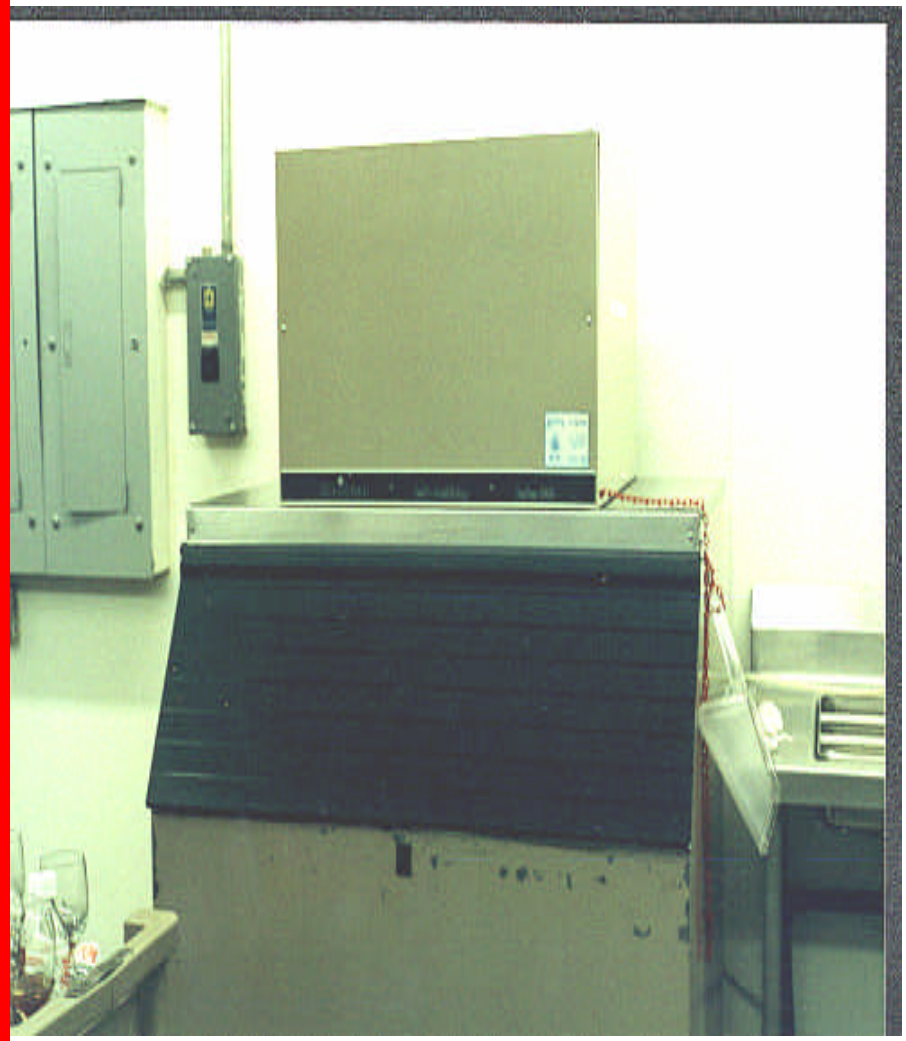


So Do I have to Dump my Blow-down

- **No! Many places use the blow-down for other uses such as landscape irrigation or scrubber water.**
- **You must check local regulations first.**

Once-through Cooling

- Air cooled
- Connect to cooling tower
- Use water for other purposes



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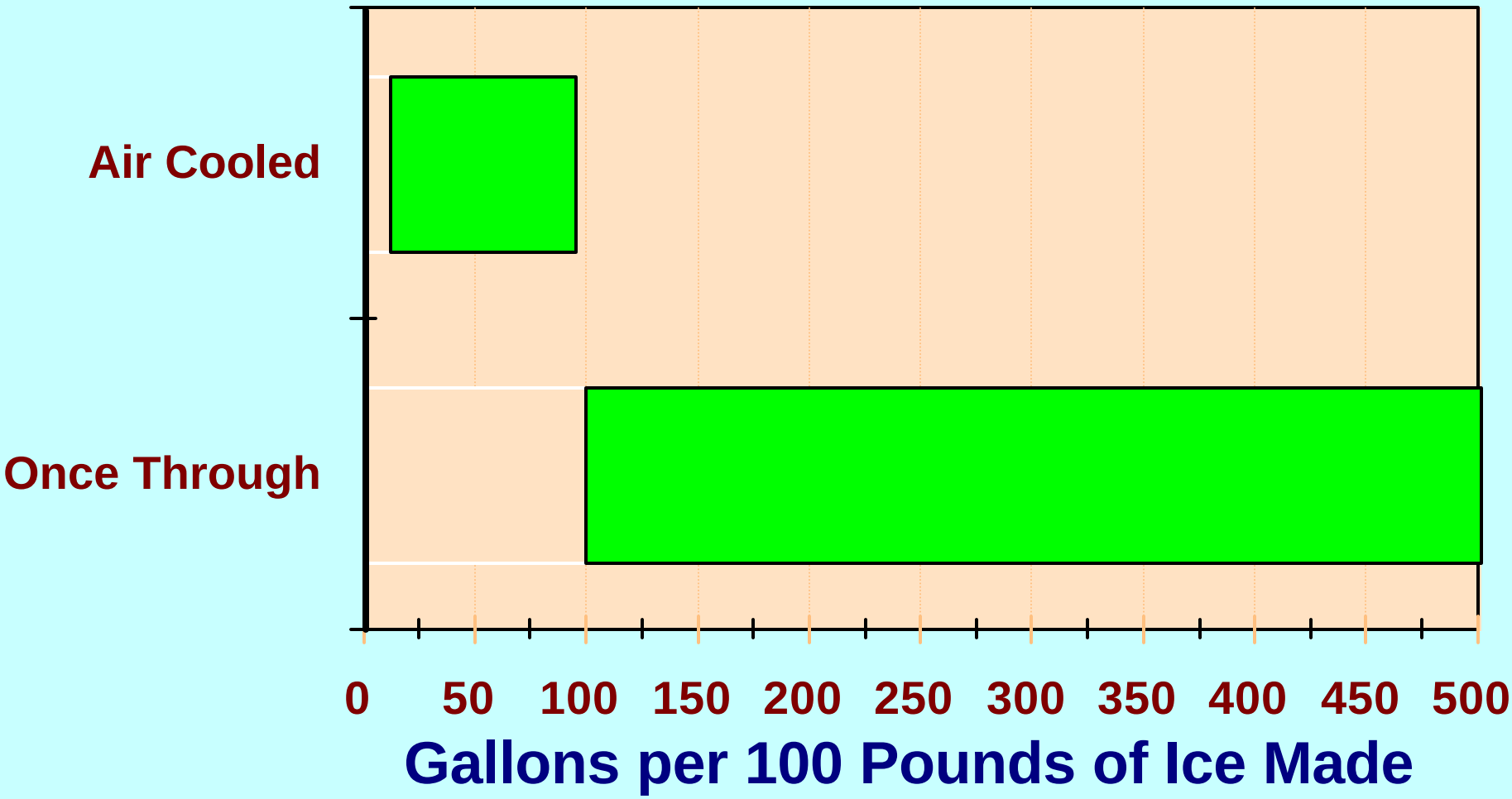
Comparison of Water Use for Ice Making

Commercial Units



Air pollution for Power use for Water and Wastewater Treatment

Based on Austin Mix of Generation

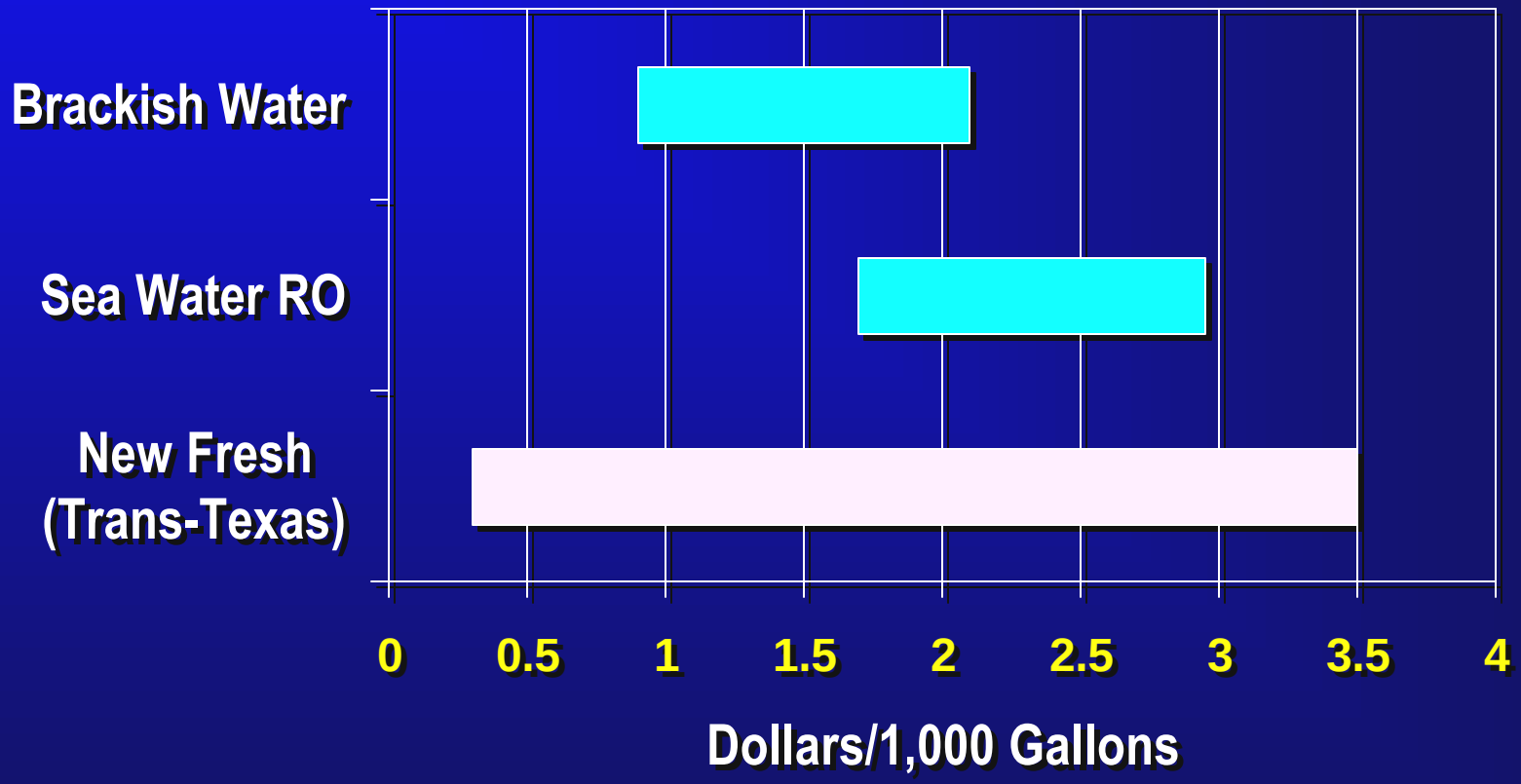
Pollutant	SO_2	NOx	Particulates	CO	CO_2
Grams/kWh*	1.58	1.22	0.13	0.16	540.0
Grams/1000 Gal.	**6.2**	**4.8**	**0.5**	**0.6**	**2,277.3**

The True Cost of Water

- Water Cost
- Sewer/Pre-treatment
- Energy
- Chemicals
- Solid Waste Disposal
- Capital Equipment
- Labor
- Liability

Comparison of New Fresh Water Supplies to Desalting Cost in Texas

(Treated water at pressure in system)



Example Non-Residential Water & Sewer Rates

($/1000 gallon)

Water	**$ 2.00**
Sewer	**$ 3.00**
Total	**$ 5.00**

Cost of Water Heated to 140ºF

Dollars per 1000 Gallons

Fuel	Energy	Water	Sewer	Total
Electricity	$7.50	$2.00	$3.00	$12.50
Gas	$3.50	$2.00	$3.00	$8.50

Unit Cost

0.5 to 1.3 cents per gallon

Depending on inclusion of Energy.

Some Examples

Process Considerations

- **Process adjustments**
- **Process modifications**
- **Process substation**
- **Materials substation**

Plumbing

Daily Use at Work

1.2 Toilet Uses
3.0 Urinal Uses

Daily Use at Work

3.8 Toilet Uses

Installing a Waterless Urinal

Flush Valve Information

Replace insert yearly at $35 + labor

2.8 to 3.6 cents per male per day or $6 to $9 per male per year

Laundry

- Separate by cycles needed
- Choose efficient equipment
  - **2.5 gal/lb or less**
- Choose water saving technologies

An Example of Water Reuse at a Hotel Laundry.

Pools & Spas

- Leaks & Repair
- Reuse of filter backwash

Spray Systems Waste Water


Car Wash
$1 BILL
CHANGER
ONLY IN TEXAS!

Landscape

A great place for

Alternate sources of water

Food Service

Many Uses and Opportunities

Types of Use

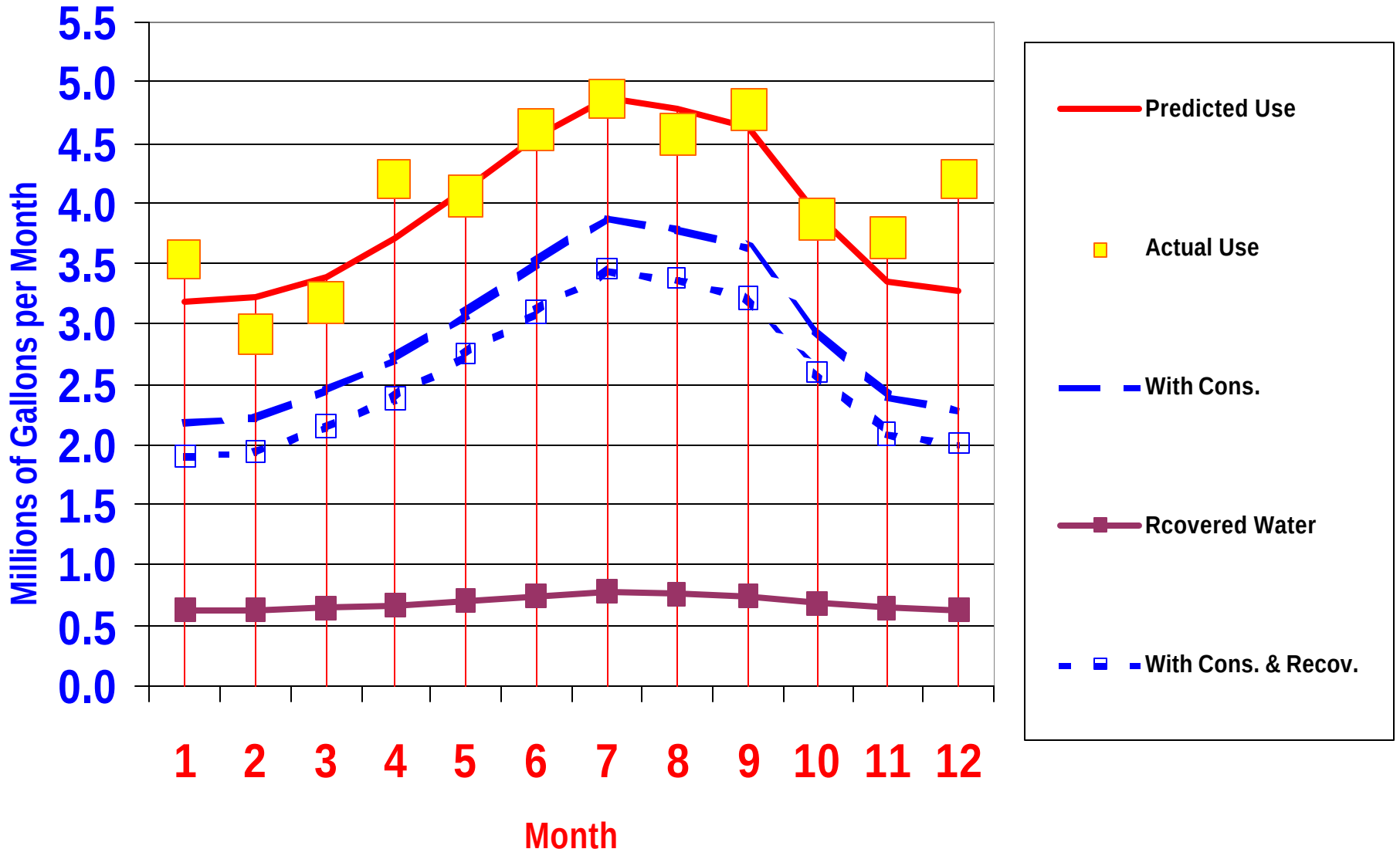
- Dish Washer
- Garbage Disposal
- Scullery
- Heated Serving Tables
- Ice Machine
- Faucets
- Thawing Food

&

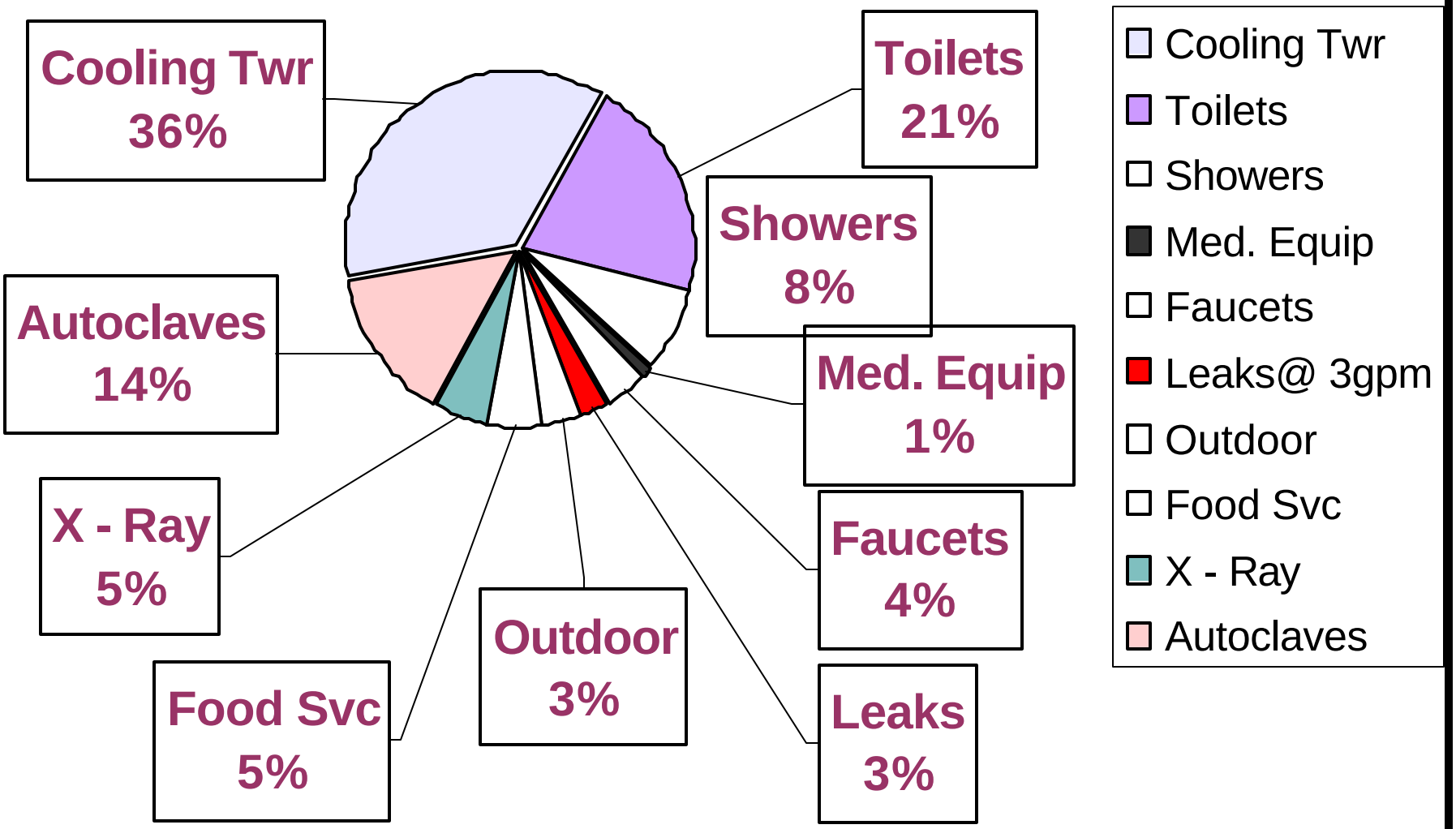
- Freezers and Refrigerators
- Ice Cream Machines
- Coffee Urns
- Steam Cabinets
- Boilers
- Steam Kettles
- ???

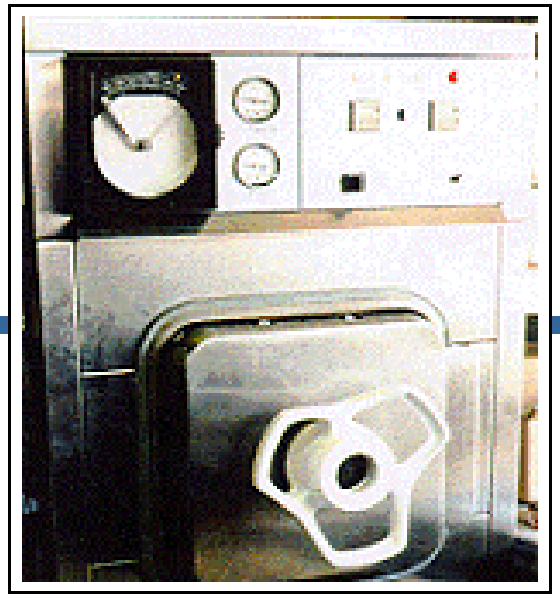
- 90% less water
- Big energy savings
- No water hookup
- No sewer hookup
- No vent

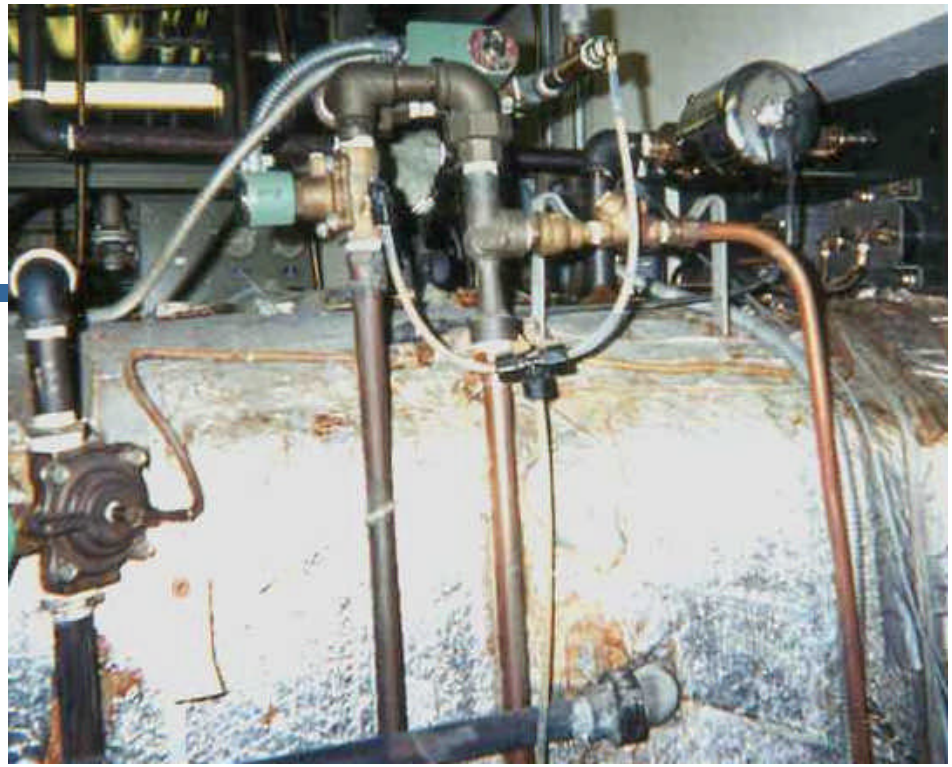
Monthly Water Use at a Local Medical Center



Annual Water Use at A Large Medical Center Before Conservation

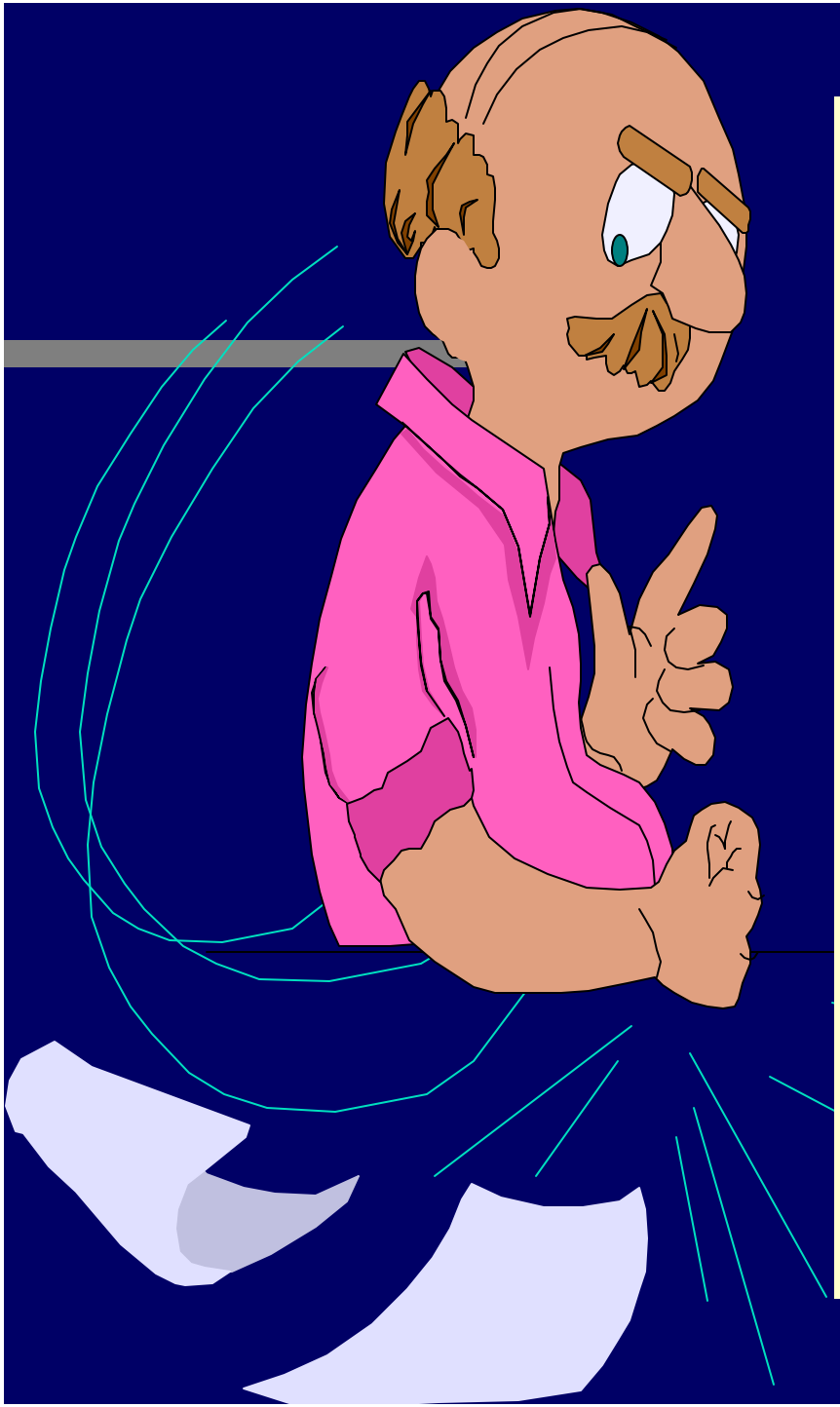






Alternate Sources

- Storm/rain water
- Local groundwater
- Air conditioner condensate
- Reclaimed Water
- Other sources??



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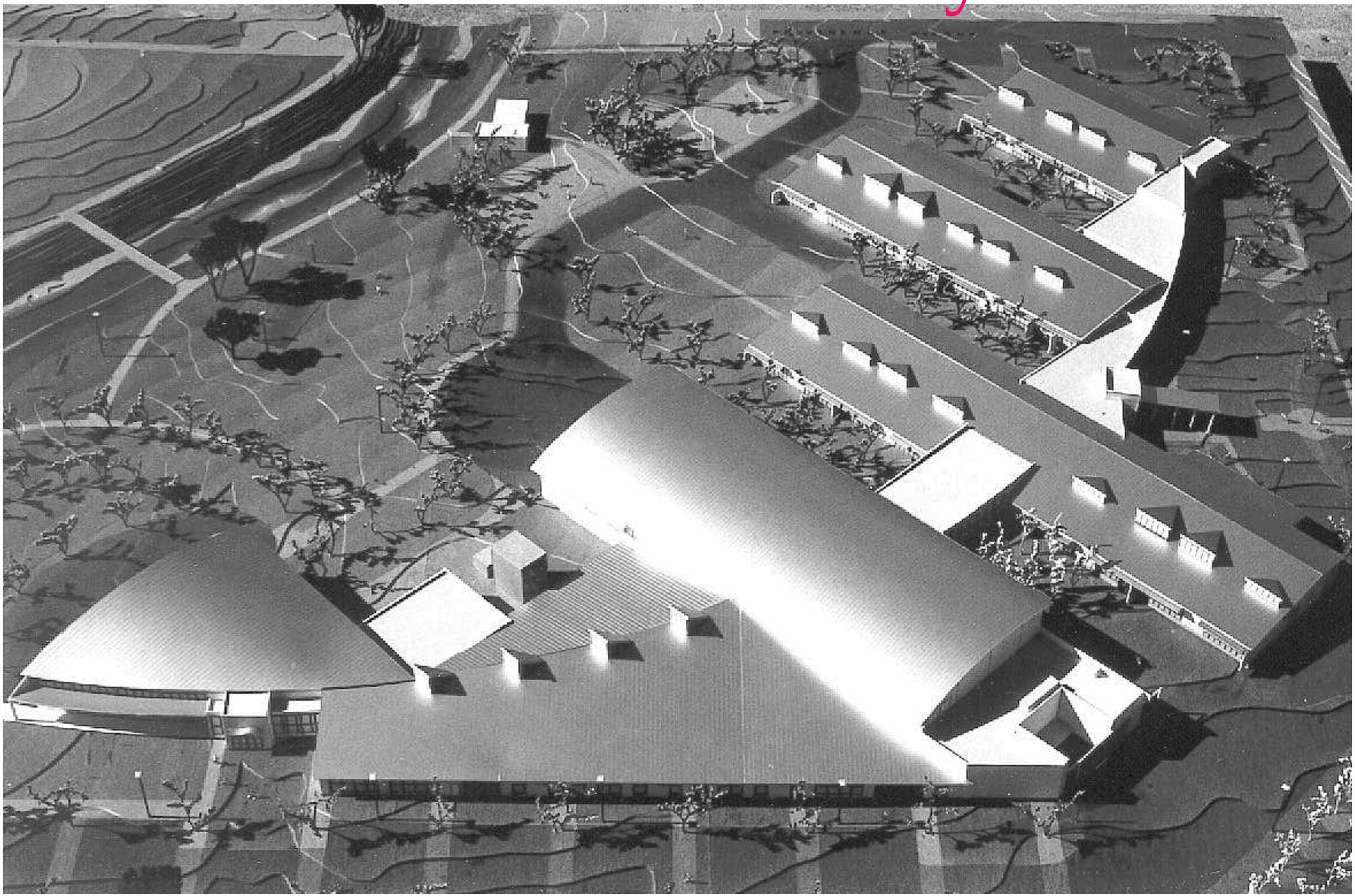
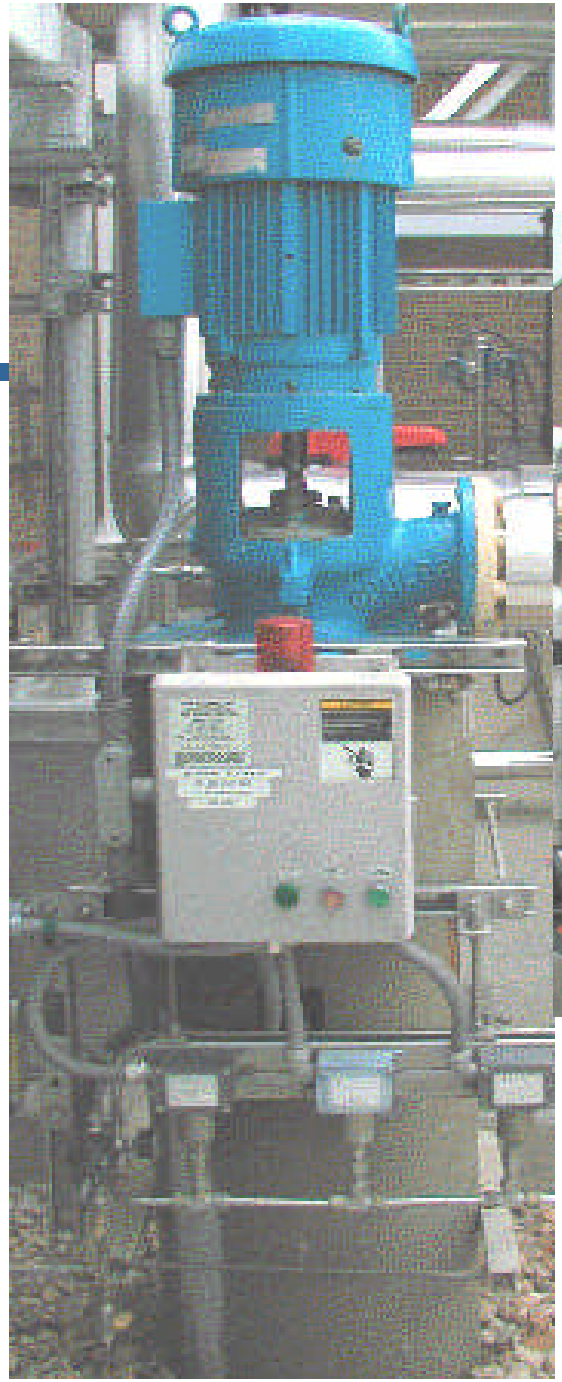




Other Examples Around Texas

- **Baylor Medical Center Houston**

35% of cooling tower makeup from condensate

- **Reynolds Aluminum Corpus Christi**

As much as one fourth of plant water comes from harvest rainwater (as much as 2.5 MGD)

- **Cement Plants Around Texas**

50% to 70% of plant water from runoff

City Services & Rebates

and

Other Tax Incentives
&
Funding Sources

Incentive$

- Your Savings
- Property Tax Break
- Sales Tax Break
- Special Rebates
- Public Image

Performance Contracting

- **Available for the first time for water for all government entities in Texas**

- **Water to be included in all audits of facilities for first time**

City Incentives & Services

- **Rebates based on amount of water saved**
- **Services including:**
  information, on-site surveys, newsletters, employee training programs, awards, links to other sources, and more.

Some Rules of Thumb

- Rainwater Harvesting
- Condensate Recovery
- Quantifying Other Sources

Rainwater Harvesting

- One inch of rain = 0.623 gallons of water per square feet.

- Holdup by collection surface

Metal Roof 0.06 inches per rain event
Composition Roof 0.12 inches per event
Flat roof 0.20 inches per event
Pavement 0.15 to 0.3 inches per event

Rainwater Collection Equation

Ending storage = Starting Storage + Rainfall + Other Sources Use Evaporative Loss.

If ending storage less that zero = zero

If ending storage more that cistern volume than ending storage = cistern volume

Air Conditioner Condensate

- First find out normal latent heat percent (LHp)for your area from HVAC companies

- Maximum Condensate (***gal. per hour***) = 100 X LHp X 1.44 X Ton-hours of actual operation

Other Sources

- **You will need to measure flow using one of the following methods.**

  Metered use

  Bucket and Stopwatch (1 gpm = 1440 gal. per day)

  Manufacturers data

BENCHMARKING

How do I compare to other facilities like me?

Office building efficiency benchmarks

End Use/Benchmark Measure	N	Efficiency Benchmark Range*
INDOOR USE		
Gal./sf/year	62	9 - 15
Gal./employee/day	72	9 - 16
COOLING USE**		
Gal./sf/year	49	8.5 - 22
IRRIGATION USE**		
Inches per year	47	26 - 50
TOTAL WATER USE**		
Gal./sf/year	62	26 - 35

* Developed from combined methods (field studies, audit data, and modeling results)

** Appropriate benchmarks will depend upon local climate.

School efficiency benchmarks

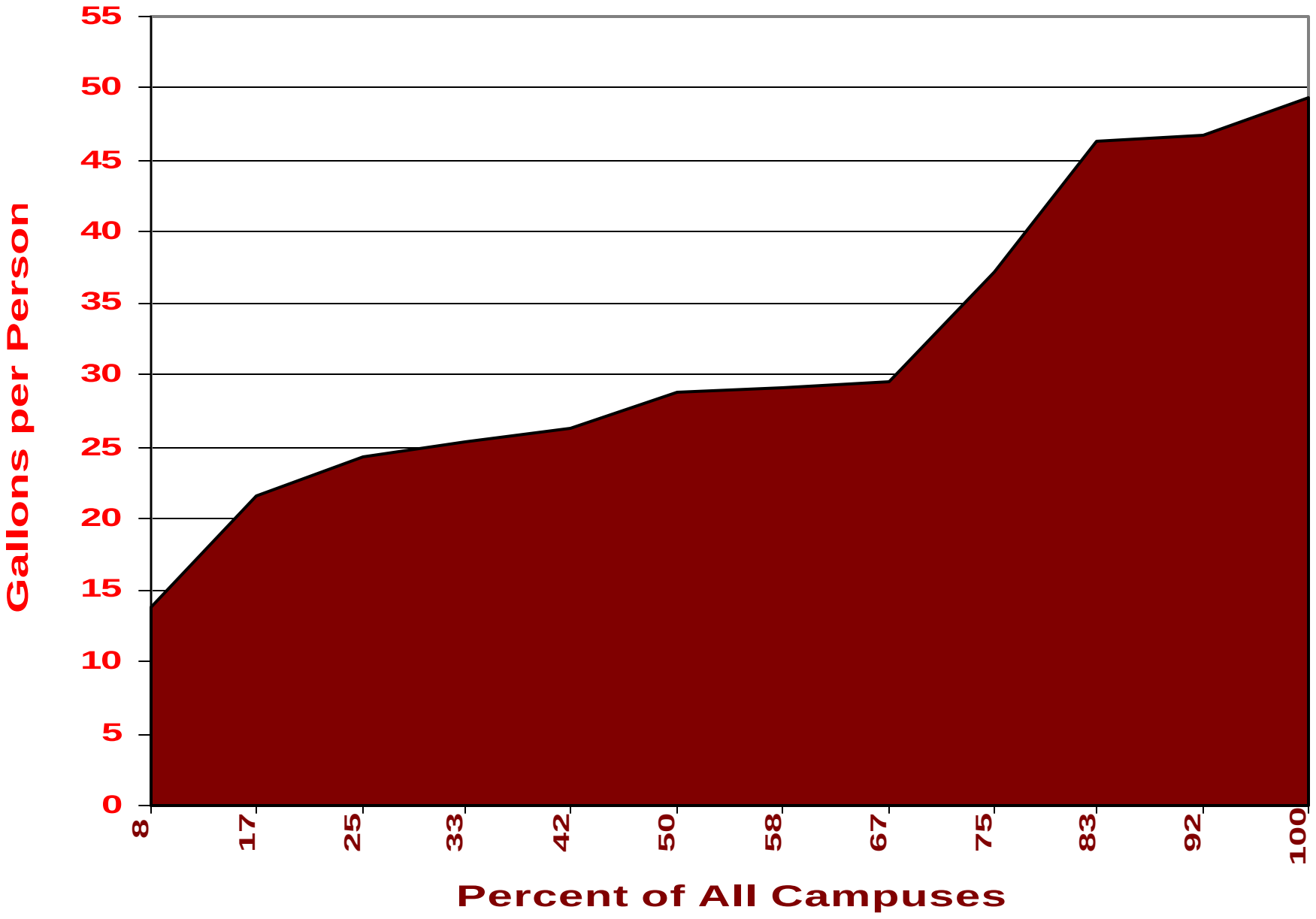
End Use/Benchmark Measure	N	Efficiency Benchmark Range*
INDOOR USE		
Gal./sf/year	142	8 - 16
Gal./person/day	141	3 - 15
COOLING USE**		
Gal./sf/year	35	8 - 20
IRRIGATION USE**		
Inches per year	132	22 - 50
TOTAL WATER USE**		
Gal./sf/year	142	40 - 93

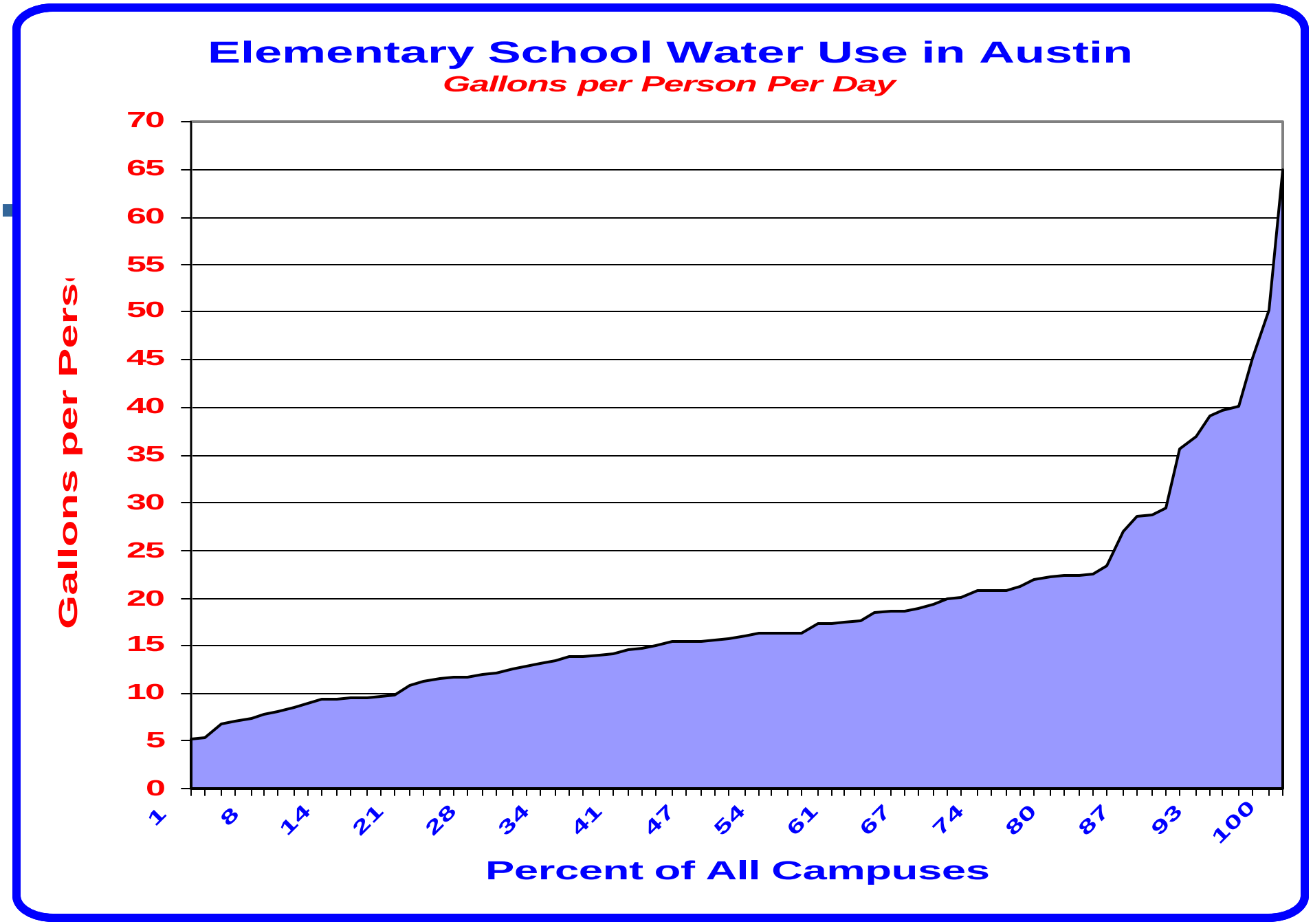
* Developed from combined methods (field studies, audit data, and modeling results)

** Appropriate benchmarks will depend upon local climate.

High School Water Use in Austin

Gallons per Person Per Day




Elementary School Water Use in Austin
Gallons per Person Per Day
Gallons per Pers
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1
8
14
21
28
34
41
47
54
61
67
74
80
87
93
100
Percent of All Campuses

The Seven Questions

- How much?
- Where?
- When?
- How?
- Who?
- Why?
- What other way?

The Eight Steps

- ✶Involve Management
- ✶Designate Responsibility
- ✶Survey System - Audit
- ✶Involve / Reward Employees
- ✶Analyze Possibilities - *The Plan*
- ✶Implement Plan of Action
- ✶Show Progress to Employees
- ✶Evaluate & Revise

Finally Remember

The Cheapest Water You Will Ever Have Is The Water You Already Have!

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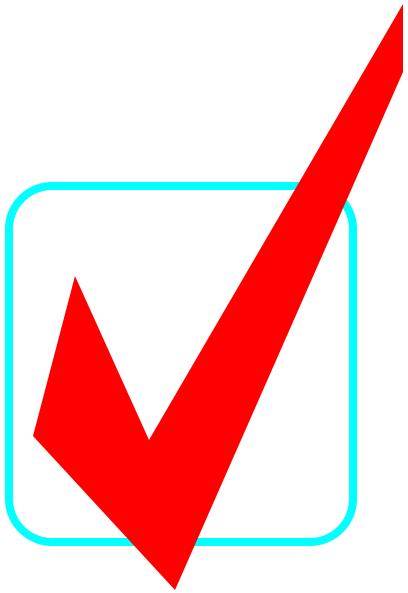

End